U.S. Department of Commerce
National Weather Service
Quad Cities, Iowa/Illinois

INFORMATION SHEET

DROUGHT: THE CREEPING DISASTER

Drought has been called a creeping disaster because of the way it develops slowly. Drought doesn't make the headlines the same way other disasters do, but its impacts on crops and water supplies rival those of other disasters. Indeed, cost estimates of the nationwide losses from the 1988 drought exceed $30 billion, equaling or even exceeding the losses caused by Hurricane Andrew in 1992 and the Mississippi floods of 1993.

General Definition

Drought is a persistent and abnormal moisture deficiency having adverse impacts on vegetation, animals or people. There are dozens of more specific drought definitions used around the world based on the lack of rain over various time periods or measured impacts such as reservoir levels or crop losses. Because of the various ways people measure drought, no one has produced an objective drought definition upon which everyone can agree.

Drought Types

There are three main ways to consider drought.

1) *Meteorological* drought is usually based on long-term precipitation departures from normal, though high temperatures often play a role.

2) *Hydrological* drought refers to deficiencies in surface and subsurface water supplies. It is measured as streamflow, and as lake, reservoir, and ground water levels.

3) *Agricultural* drought occurs when there isn't enough soil moisture to meet the needs of a particular crop at a particular time. Agricultural drought is typically evident after meteorological drought but before a hydrological drought.

Key Concepts

1) Drought is a normal part of virtually every climate on Earth. Drought isn't what we picture as "normal" weather, but history shows that droughts and floods are both part of the normal continuum of weather patterns.

2) Each place needs its own working definition of drought. Twenty inches of rain in a year would be slightly wetter than normal in Lubbock, Texas, but would be a severe drought in Nashville, Tennessee.

3) Weather isn't the only cause of drought. Drought can result from both natural events, such as a long dry spell, and human activities that increase demand for water.

4) One rain doesn't necessarily end a drought. It can take months of below-normal precipitation to create a drought, and it often takes more than one good rainfall to catch up.

Drought Planning and Drought Indices

Drought planning usually involves picking or creating an index to identify and quantify departures from normal. Drought indices assimilate thousands of bits of data on rainfall, temperature, snowpack, streamflow, and other water supply indicators into a comprehensible big picture that is far more useful than raw data for decision-making. A drought index, such as the Palmer Drought Severity Index (PDSI), is typically a single number associated with a description, such as "moderate drought." The various versions of the Palmer Drought Index are perhaps the best known meteorological indicators of dryness, and have been calculated for every part of the country going back more than 100 years.

Improved Monitoring

Careful monitoring of drought can ease its impacts, allowing people to take actions early that prevent harsh impacts later. Both federal and private meteorologists are doing their part by producing better monitoring and forecast products. At the federal level, an interagency consortium involving USDA, NOAA/NWS, and the National Drought Mitigation Center in Lincoln, Nebraska, began producing the Drought Monitor in 1999. The Monitor includes a weekly national map displaying dryness divided into five categories, or levels of intensity. The categories are based on readings from a number of different drought indices, giving the user a composite picture of many indicators. Drought information is updated daily through use of the thousands of observations available from cooperative weather observers. The three agencies that create the map also consult with numerous experts from other agencies and offices across the country so that the map can be tweaked as needed to depict what is happening in the real world. The drought analysts also indicate on the map if conditions forecast over the next 2 weeks will result in significant changes to the drought situation.

Improved Forecasting

Improved remote sensing from satellites and radar as well as the use of thousands of precipitation measurements daily have improved the ability to monitor drought, but the most exciting developments in mitigating drought impacts may be advances made in forecasting the conditions that result in drought. Meteorologists at NWS' Climate Prediction Center are using the medium-range forecast models to forecast soil moisture two weeks into the future. For the longer term, they are using statistical techniques and historical drought information to construct analogues to current conditions. They then

create forecasts up to several seasons ahead of time based on what happened in the past. CPC is also using sophisticated computer models that link ground and ocean conditions to the overlying atmosphere to create forecasts of temperature, precipitation, and soil moisture months ahead of time.
In short, there is a sea change going on in the ability to monitor and forecast dryness, and coming months and years will bring even more developments in this field.

FOR MORE INFORMATION

By PHONE
Contact our *Service Hydrologist*: **563/386-3976 x493**.

By FAX
563/386-7765.

By INTERNET
Visit our *Web site*: **http://www.crh.noaa.gov/dvn/**.

By MAIL
Contact our *Service Hydrologist*: **National Weather Service**
9050 Harrison Street
Davenport, Iowa 52806-7326

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